(No Model.) 4 Sheets—Sheet 1.

W. GILFILLAN.

COMBINED DOOR CHECK AND SPRING.

No. 488,651. Patented Dec. 27, 1892.

Fig. 1.

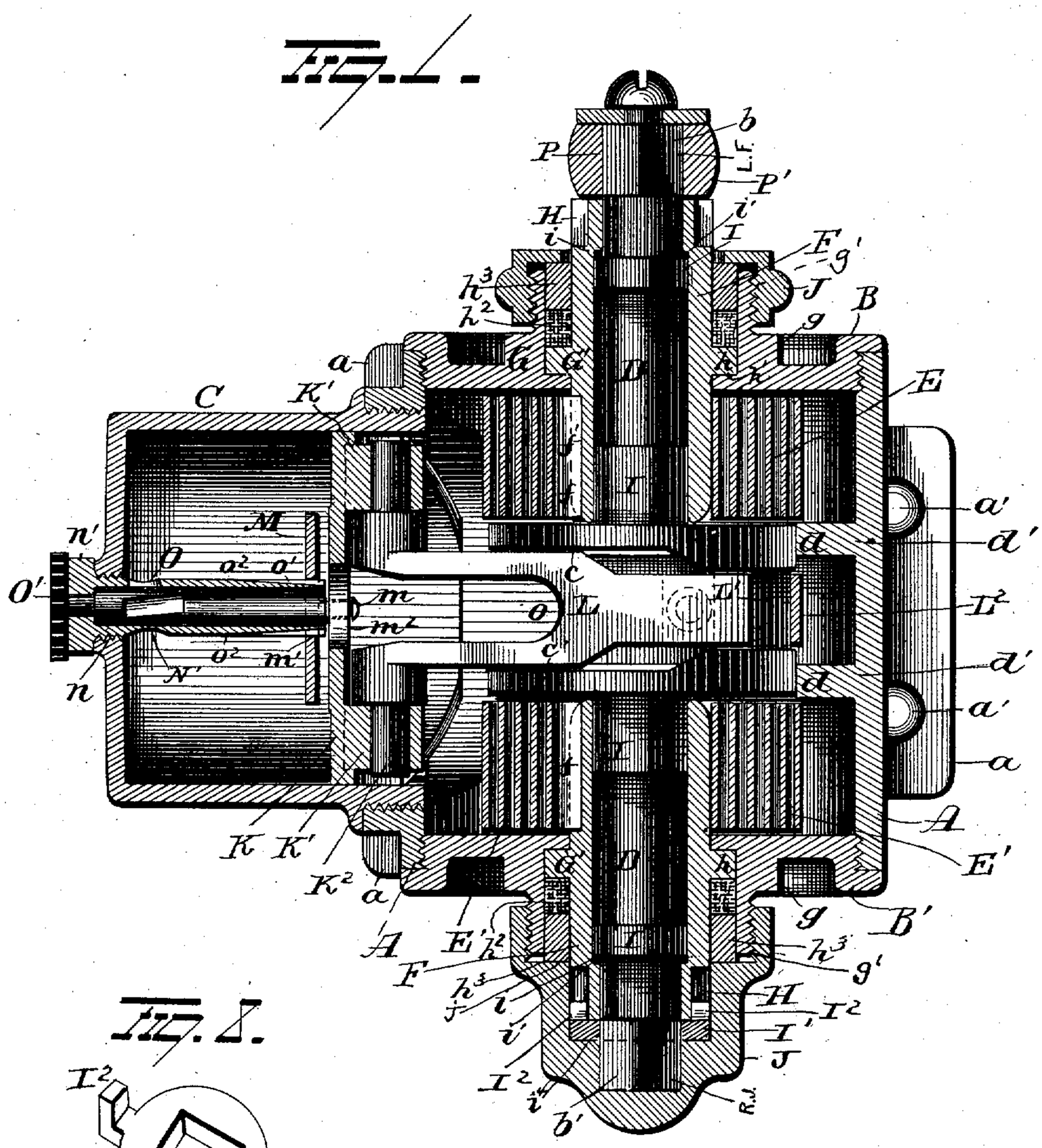
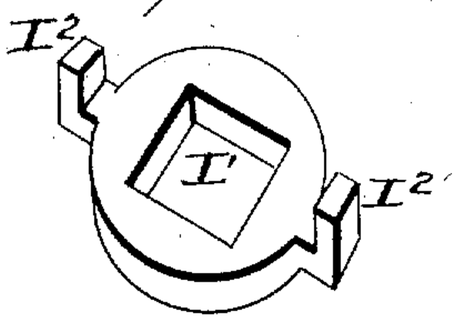


Fig. 1.



Witnesses
E. Nottingham
G. F. Downing.

Inventor
Wm. Gilfillan
By H. A. Seymour
Attorney

(No Model.) 4 Sheets—Sheet 2.

W. GILFILLAN.

COMBINED DOOR CHECK AND SPRING.

No. 488,651. Patented Dec. 27, 1892.

FIG. 2.

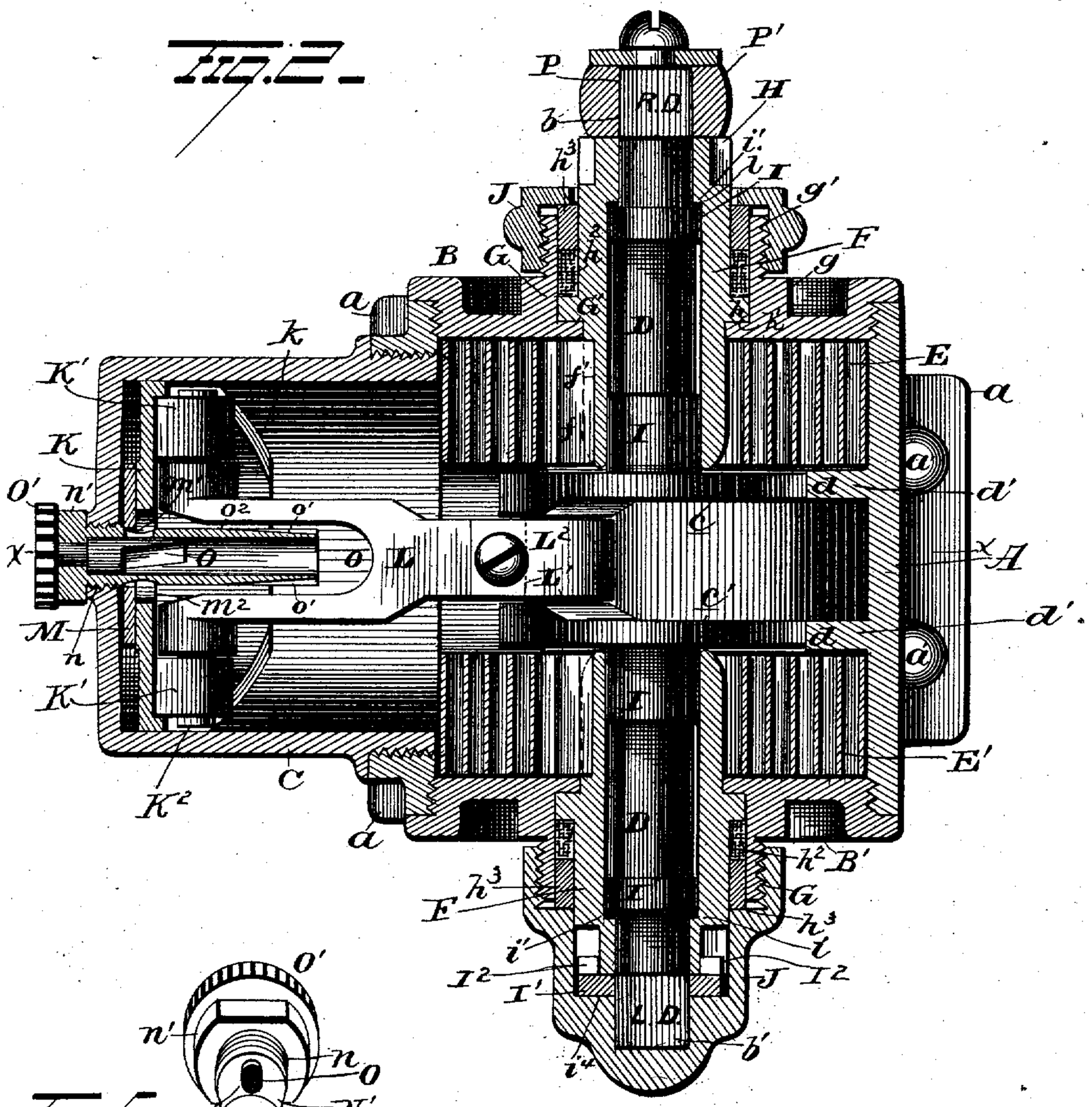
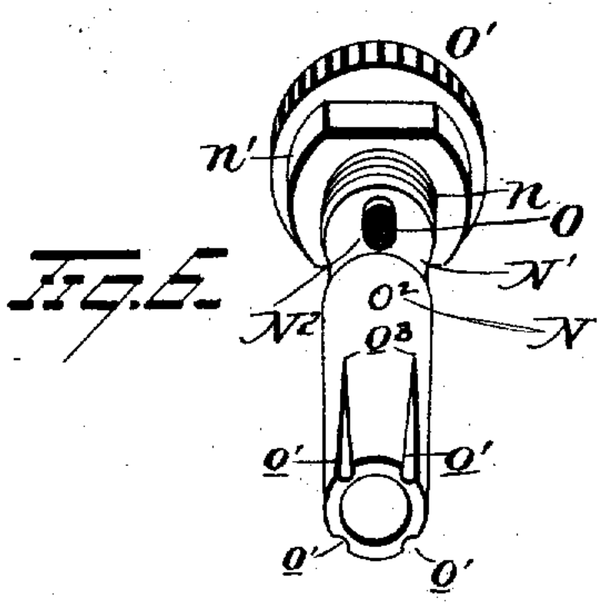


FIG. 5.



Witnesses
C. A. Nottingham
G. F. Downing.

Inventor
Wm. Gilfillan
By H. A. Seymour
Attorney

(No Model.) 4 Sheets—Sheet 3.

W. GILFILLAN.

COMBINED DOOR CHECK AND SPRING.

No. 488,651. Patented Dec. 27, 1892.

Fig. 3.

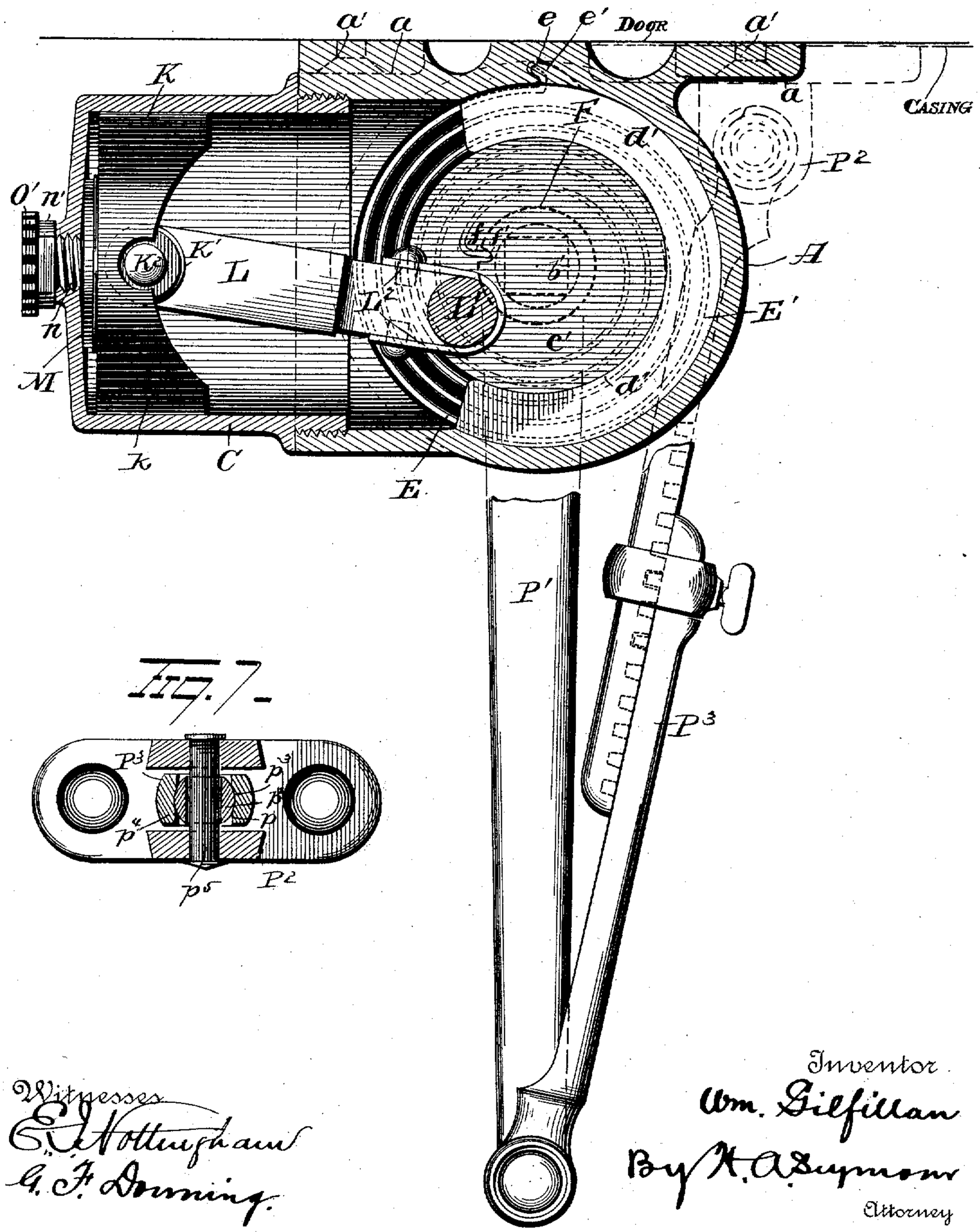


Fig. 7.

Witnesses
E. Wottenham
G. F. Downing.

Inventor
Wm. Gilfillan
By A. A. Seymour
Attorney

(No Model.) 4 Sheets—Sheet 4.

W. GILFILLAN.

COMBINED DOOR CHECK AND SPRING.

No. 488,651. Patented Dec. 27, 1892.

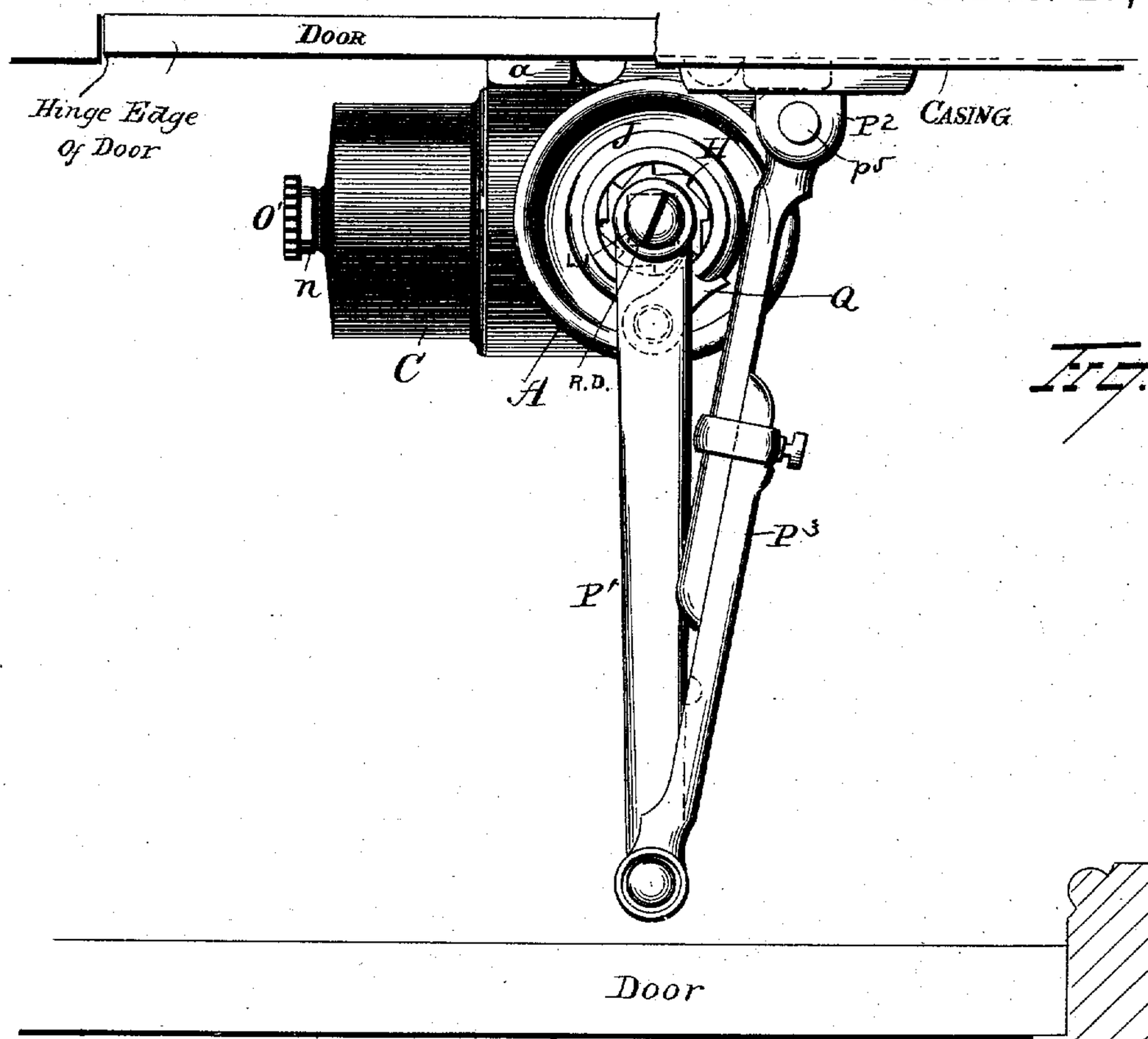


Fig. 4.

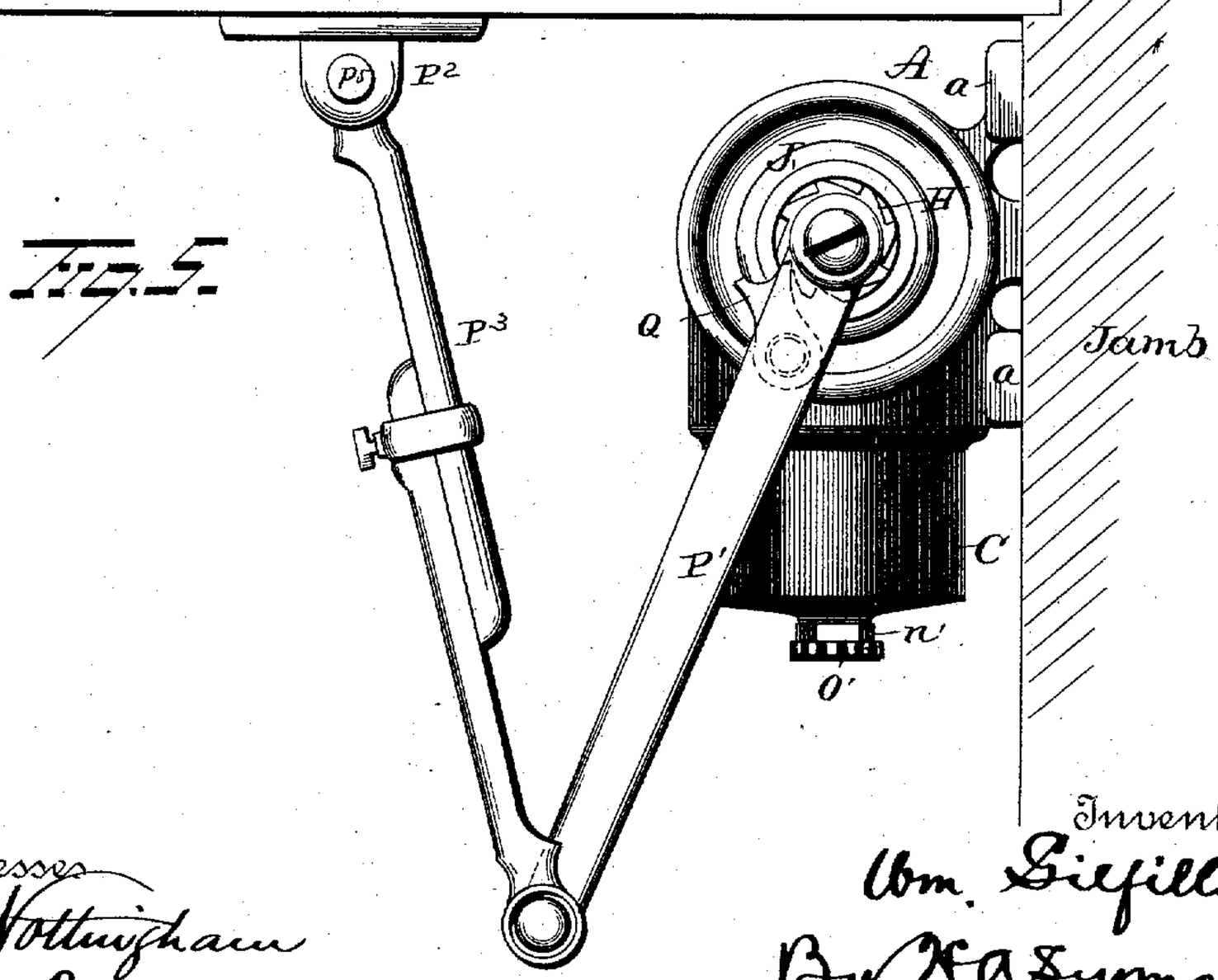


Fig. 5.

Witnesses
C. C. Nottingham
G. F. Downing.

Inventor
Wm. Gilfillan
By K. A. Seymour
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM GILFILLAN, OF NEW BRITAIN, CONNECTICUT.

COMBINED DOOR CHECK AND SPRING.

SPECIFICATION forming part of Letters Patent No. 488,651, dated December 27, 1892.

Application filed August 31, 1892. Serial No. 444,646. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GILFILLAN, of New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Door Checks and Springs Combined; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in door checks the object of the invention being first. To provide a door check of such construction that it may be readily applied to either a right or left hand door and in either case be connected either to the door and door jamb, or the door and its casing. Second. To provide a door check in which its spindle is actuated by the combined power of separate and independently adjustable springs and thereby so increase its range of power as to enable it to operate very light as well as very heavy doors. Third. To provide simple and efficient means for supporting the central portion of the spindle and maintain it straight and true throughout its length. Fourth. To provide improved means for gradually checking the speed of the door in closing. Fifth. To provide means for packing the end of the spindle and thereby prevent the leakage of the checking liquid. Sixth. To provide certain other improvements in the details of construction of liquid door-checks.

With these ends in view my invention consists in certain features of construction and combination of parts as will be hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in vertical section taken through the spring and checking cylinders, showing the position and relative arrangement of the different parts when the door to which the check is applied is wide open. Fig. 2 is a similar view when the door is closed. Fig. 3 is a sectional view, on line *x*—*x*, of Fig. 2. Fig. 4 is a plan view of the check when applied to a door and door casing. Fig. 5 is a similar view showing the check applied to a door and the door jamb. Fig. 6 is a detached view in perspective of the venting tube. Figs. 7 and 8 are detached views.

A represents a cylinder having brackets *a a* which are preferably cast integral therewith and are provided with holes *a'* for the insertion of screws by which the device may be secured in place. Cylinder A is constructed with open ends which are closed by the screw caps B B'. To one side of cylinder A is detachably secured a checking cylinder C. A spindle D the opposite ends *b b'* of which are squared extends through cylinder A. On the central portion of the spindle are formed or secured two crank disks *c*, *c'*, the peripheries of which are seated in the segmental bearings *d d* formed in the parallel flanges *d' d'* which are cast on the interior of cylinder A. These central spindle bearings being located on opposite sides of the pitman through which power is transmitted at right angles to the spindle, serve to retain the spindle against lateral movement and relieve its end bearings within the stuffing boxes from any undue wear and further prevent the spindle from bending at any point between its end bearings.

E, E' are springs, permanently secured within the opposite and open ends of cylinder A. Each spring has an outwardly turned hook *e* formed on its outer end which engages in a notch *e'* formed in the inner wall of the cylinder whereby the outer end of the spring is detachably secured to the cylinder. The inner end of each spring is bent back to form a hook *f* which engages a longitudinal groove *f'* formed in the sleeve F which encircles the end of the spindle. Screw caps B B' are each constructed with a sunken outer face and a central boss G the interior of which is provided at its lower or inner end with an inwardly projecting annular flange G'. Boss G is encircled by the squared faces *g* to which a wrench may be applied in fastening or removing the screw cap and is provided with screw threads *g'* for the attachment of a packing gland.

Each one of the sleeves F which I designate as ratchet sleeves or swivels is constructed with an outwardly projecting annular flange *h* the inner surface of which constitutes an annular seat *h'* which engages the annular flange or seat G' on the screw cap. The outer end of the sleeve has applied thereto any suitable packing h^2 against which is seated a metal ring h^3 the outer surface of which snugly

fits within the bore of the boss. A ratchet H is cast integral upon the outer end of the sleeve. The bore of each sleeve is formed to fit snugly on the collars I formed on the spindle near its opposite ends, while an annular space is formed between the inner surface of the collar and that portion of the spindle on each side of its collar or outwardly projecting flange I. The annular space on the inside of the collars I I, or between them serves to prevent the liquid contained in the receptacle from rising by capillary attraction and working its way through the packing and joints around the spindle. A shoulder *i* is formed within the sleeve near its outer end and between this shoulder and the collar I in the spindle is inserted suitable packing *i'* which prevents the liquid from leaking between the spindle and sleeve. One of the sleeves, with its packing and packing ring h^3, is slipped over the lower end of the spindle, and then the screw cup J is screwed down snugly on the nipple or boss. A shoulder *j* within the cup engages the outer edge of the ring h^3 and forces it against the packing h^2 thereby expanding it so as to form a perfectly tight joint around the sleeve. After the metal ring h^3 has been forced to its place, the screw cup is removed and when the spindle has been rotated so as to impart the desired tension to the spring, the locking dog I' is applied to the squared lower end of the spindle—and by which it is prevented from rotating while the teeth I^2 of the locking dog engage the teeth of the ratchet and thus lock the latter with its sleeve to the spindle. The locking dog is retained in place by means of the cup gland the annular shoulder i^4 of which prevents the disengagement of the locking dog from the ratchet. The cup gland prevents the leakage of any liquid out of the bottom of the receptacle because should a little of the liquid leak past the packing around the spindle and around the sleeve, it would be caught by the cup gland and retained therein. It will thus be observed that each end of the spindle is supported in bearings formed by the sleeve F F, while its central portion has a firm and extended bearing through the medium of the two crank disks the peripheries of which engage the two parallel segmental bearings on the inner surface of the cylinder; further, that each one of the sleeves F F is thoroughly packed between its inner surface and the spindle and between its outer surface and the boss on the screw caps; further, that each one of the sleeves is at all times locked to the inner end of a coiled spring, the outer end of which is secured to the casing; that both of the coiled springs are so connected with the spindle through the medium of sleeves F F, and with the casing that they exert their combined power in rotating the spindle.

By using two springs instead of one a greater range of power is insured the door check and hence it is rendered applicable to doors of a great range in weight. This is due to the fact that by the use of two springs the combined power of which is equal to that of a single heavy spring, they are enabled to operate doors as large and heavy as could be operated by a single heavy spring. On the other hand, the single springs may be adjusted to do much lighter work than is possible to be performed by the single heavy spring, and further much finer and more delicate adjustments may be given the two springs than could be imparted to a single heavy spring; that by means of the locking dog adapted to be applied to either end of the spindle the springs may be independently adjusted and their combined power utilized in rotating the spindle.

K is a piston made in the form of a shell and having a wide periphery *k* which fits snugly within the cylinder C, and owing to its extended bearing it is thereby rendered practically liquid tight without recourse to piston packing, though any suitable packing may be used if desired. On the inner face of the piston are formed ears K' within which are pivoted the laterally projecting studs or pins K^2 on the outer end of pitman L the inner end of which is connected by a strap L^2 with a crank L' which latter is fastened at its opposite ends to the crank-disks. In order that the pitman may be retained in alignment with the piston and the cylinder, the adjacent sides of the crank disks near the crank are made to snugly fit the sides of the pitman and serve as bearings therefor. A valve M is attached to the outer face of the piston by means of guide pins *m* which allow the valve a limited movement toward and from the piston. Valve M is constructed with a central opening *m'* which registers with a larger opening m^2 extending through the piston head. Through the outer end of checking cylinder is inserted a venting tube N provided near its outer end with screw threads *n* which engage corresponding screw threads formed in the end of the checking cylinder. The outer end of venting tube is provided with a nut *n'* by which it may be turned by a wrench in securing it in place or removing it from the cylinder. At a point on the venting tube near its outer end is formed an annular groove N', and also a vent opening N^2 which latter extends through the wall of the tube. A rotary valve O is inserted within the outer end of the vent tube and is provided with a disk O' by which it may be rotated and thereby adjusted so as to vary the flow of liquid through the opening N^2. The main body of the vent tube is cylindrical in form and is made to snugly fit within the central opening *m'* in the valve and hence when the piston is forced through its outward stroke, the vent tube projects through the valve and piston. To admit of this, the pitman is cut away or bifurcated at *o* to receive the outer end of the vent tube when the piston is forced to the limit of its outward movement. In the outer

surface of the vent tube are formed any desired number of longitudinal tapering grooves O′, four such grooves being shown in the drawings. These grooves are of the greatest depth and width at the outer end of the tube and gradually diminish in width and depth until they merge into the smooth portion o^2 of the tube.

When the spindle is rotated to draw the piston inwardly the valve M will be forced outwardly by the resistance of the checking liquid whereby the latter will flow freely through the opening in the piston head and through the opening between the valve and piston head and enter and fill the space between the end of the checking cylinder and the piston. At this point I will call attention to the fact that the checking liquid has free access to the spring chambers and to the checking cylinder. It comes in direct contact with the springs lubricating them and preventing friction. It also lubricates all bearings of the spindle so that they require no oiling. When the piston is moved in the opposite direction the checking liquid operates by its resistance to force valve M against its seat and thereby prevent the escape of liquid past it. Hence the only channels for the escape of liquid to the opposite side of the piston when the piston commences to move outwardly is through the vent opening N^2, and the bore of the tube, and through the tapering grooves O′. As vent opening N^2 may be varied in size by adjusting the rotary valve O, the escape of liquid through this passage may be regulated as desired. The liquid will escape most freely through the tapering grooves O′ when the piston has just commenced its outward movement or in other words when the door first commences to close. As the piston continues to move outwardly the amount of liquid flowing through the tapering grooves will be gradually decreased until the piston has reached the point o^3 where the tapering grooves merge into the smooth or ungrooved portion o^2 of the tube, when there will be no further escape of the checking liquid through these grooves. During the movement of the piston from the outer end of the vent tube to the point o^3 the door will have been gradually checked and as the piston moves over the ungrooved portion o^2 the door will move quite slowly in closing. When the valve M reaches and passes over the annular groove N′ the liquid is allowed a free escape through this groove, past the walls of the central opening m' of the valve and through the central opening in the piston to its opposite side. By reason of this sudden release of the checking medium just as the piston has reached nearly the limit of its outward movement or stroke, the door is suddenly released to the action of the spring and sufficient force is exerted thereby to insure the positive latching of the door. Without this releasing action, the door being gradually checked will move so slowly and with so little momentum that it will frequently fail to latch, while a positive latching of the door is insured by suddenly releasing it to the action of the spring just before it has moved to its position of closing. By varying the adjustment of the rotary valve O, the escape of the checking fluid through the venting tube may be regulated so as to vary the speed of the door in closing or to so adjust the release of the checking fluid as to accommodate the check to doors of varying weight and size.

To the squared upper end of the spindle is applied the squared socket P on the link P′, while the pivoted bracket P^2 on the outer end of the adjustable link P^3 is fastened to the door casing or jamb. Link P′ has a pawl Q pivoted thereto which may be thrown into engagement with the teeth of the ratchet on the sleeve. In order that the two parts of the link may have sufficient freedom of action to prevent their binding in the event of the warping or sagging of the door or jamb, or to any cause which would result in throwing the parts out of alignment, the pivotal end of one of the links is cast with a large hole p into which is placed a steel socket p^2 with a rounded outer bearing p^3. The outer walls of the link are upset as at p^4 so as to retain the socket in place. The pivotal pin p^5 passes through the hole in the end of link P^3 and through the hole in the socket p^2. This method of construction insures a free pivotal action of the two links and allows of a sufficient lateral or twisting movement of either one of the links to prevent their binding or breaking.

In Fig. 4 the check is shown as applied to a right hand door, the check being secured to the door and the bracket to the door casing. As thus applied the face of the squared end of the link is in engagement with the square on the spindle having the letters R D stamped thereon. By merely changing the arm to the square marked L. J., the check is then adapted to be applied to a left hand door and the bracket to the door jamb. Two squares on the opposite end of the spindle are also marked in the same way, and hence when it is desired to apply the check to a left hand door and the bracket to the door casing the check is inverted in its position and fastened to a left hand door. The cup gland and locking dog are removed from one end of the spindle and applied to the opposite now the lower end, while the screw gland is removed and applied to the upper sleeve. The check is now fastened to a left hand door and the bracket to the door casing the squared end of the link being applied to the square on the spindle marked L. D. By simply applying the square end of the link to the square on the spindle marked R. J, the check may be applied to a right hand door and the bracket to the door jamb. Thus it will be observed that the check may be readily applied either to a right or left hand door and the bracket to either the door casing or to the door jamb without removing the spring. The ratchet teeth are so

shaped and the pawl on the link so pivoted that is impossible to rotate the spindle in a direction to cause either one of the springs to unwind and hence all tendency to break the springs is avoided.

By making the spring chamber a part of the liquid chamber and allowing the checking liquid to flow freely from the spring chamber into the checking cylinder. I am enabled to use a large body of thin fluid such as alcohol or any equivalent fluid as the checking medium and by reason of the large supply stored in the spring chamber, the checking cylinder will be quickly and completely filled when the piston is moved outwardly from the checking cylinder on opening the door. In closing the door, the liquid in escaping from between the piston and end of the checking cylinder is cushioned by its striking the large supply in the spring chamber and thereby renders the check exceedingly soft and quiet in its operation of gradually closing the door. Again by reason of the employment of so large a body of checking liquid and of the duplex spring arrangement, the device is rendered capable of handling doors varying widely in size and weight and hence but a comparatively few sizes of these door checks will be required to meet all the demands of the trade. This will result in a saving of tools and machinery and hence in a saving in the cost of manufacture.

Instead of providing each end of the spring chamber with a screw cap, one end only may be so provided the other end being cast integral with the cylinder. In this event one of the springs would be inserted through the cylinder and to provide for this the paralliel bearing flanges would be dispensed with, and the crank-disks enlarged so as to bear on the inner wall of the cylinder. The crank-disks might be made in the form of wheels to allow of the free circulation of the checking liquid within the spring chambers. Again instead of making the crank disks and spindle in a single piece, the spindle may be made in two sections and a crank disk fastened to or formed upon the inner end of each section. A crank pin having tenons formed on its upper end could then be fastened to the disks by inserting its tenons in holes formed in the crank disks. This construction would enable the pitman or strap to be readily applied, as the crank pin could then be inserted in the bearing in the pitman, and by separating the disks the crank pin could be inserted between them, its tenons inserted in the holes in the crank disks and the latter on being forced toward each other would securely retain the crank pin against displacement. The crank-disks would be prevented from separating by the inner ends of the sleeves engaging their outer faces.

As it is obvious that many other changes in the construction and relative arrangement of the parts might be made without departing from the spirit and essence of my invention I would have it understood that I do not restrict the invention to the particular construction and arrangement of parts shown and described, but,

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A door check comprising a spring chamber, a spindle, two independent springs located in the spring chamber, each spring connected with the spindle, and a liquid checking cylinder connected with the spring chamber, substantially as set forth.

2. A door check comprising a spring chamber, a spring located in each end thereof, a liquid checking cylinder communicating with the spring chamber whereby the checking liquid may flow freely from one chamber to the other, a spindle and means for connecting either one of the springs with the spindle, substantially as set forth.

3. A door check comprising a spring chamber, a spring arranged within each end thereof, in combination with a spindle extending through the spring chamber and projecting outwardly from its opposite ends and bearing sleeves, ratchets and devices for connecting the springs with the spindle, substantially as set forth.

4. In a door check the combination with a spring chamber provided with sectional bearing ribs of a spindle having crank disks at or near its central portion which are seated on said ribs and thereby form central bearings for the spindle, substantially as set forth.

5. In a door check the combination with a spring chamber provided with centrally arranged parallel bearing ribs, a spindle provided with centrally arranged crank disks which are seated upon said bearing ribs and afford a central bearing for the spindle of springs located in the spring chamber on opposite sides of said central bearings, substantially as set forth.

6. A door check comprising a spring chamber provided at each end with a screw cap and at one side with a checking cylinder, in combination with a spindle extending through the spring chamber and its screw caps, a spring adjustably connected with each end of the spindle, a piston in the checking cylinder and means for connecting the piston with the spindle, substantially as set forth.

7. In a door check the combination with the spring chamber, spring contained therein and spindle, of a screw cap provided with a screw threaded nipple or boss, a ratchet sleeve or swivel, a packing ring, and a gland for forcing the packing ring to its seat, substantially as set forth.

8. In a door check the combination with the spindle, ratchet sleeve or swivel and packing ring, of a cup-gland which covers and protects the ratchet and end of the spindle, substantially as set forth.

9. In a door check, the combination with the

ratchet and locking dog, of a cup gland which secures the locking dog against displacement, substantially as set forth.

10. In a door check, the combination with a spring chamber, a spring arranged in each end thereof, a ratchet swivel or sleeve applied to each end of the spindle and engaging the springs, pivoted arms connected to one end of the spindle, and a locking dog for connecting the ratchet sleeve with the opposite end of the spindle, substantially as set forth.

11. In a door check, the combination with a spindle provided near its end with a collar, of a counterbored ratchet swivel or sleeve which fits upon the collar on the spindle whereby an annular space is provided between the spindle and ratchet swivel or sleeve, substantially as set forth.

12. In a door check the combination with a spindle provided with a collar near its end, of a counterbored ratchet swivel or sleeve, and packing interposed between the collar on the spindle and the inwardly projecting flange on the interior of the ratchet sleeve, substantially as set forth.

13. In a door check the combination with a spring casing provided with centrally arranged bearing ribs, a spindle provided with two centrally arranged crank-disks which are seated upon said ribs, and a crank-pin located between said crank disks, of a checking cylinder and its piston, a forked pitman and a strap for connecting the pitman with the crank-pin, substantially as set forth

14. In a door check the combination with the checking cylinder and piston, of a straight venting tube extending through the piston and provided on its exterior with one or more tapered grooves, substantially as set forth.

15. A door check comprising a spring chamber and checking cylinder constructed to form a free passage for the circulation of the checking liquid through both chambers; a spring arranged in each end of the spring chamber, a spindle extending through the spring chamber, means for independently connecting the springs with the spindle; a piston located in the checking cylinder and means for connecting the piston and spindle so that by the rotation of the latter a reciprocating movement will be imparted to the piston, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM GILFILLAN.

Witnesses:
G. E. ROOT,
C. A. BLAIR.